Trend Study 18A-30-07

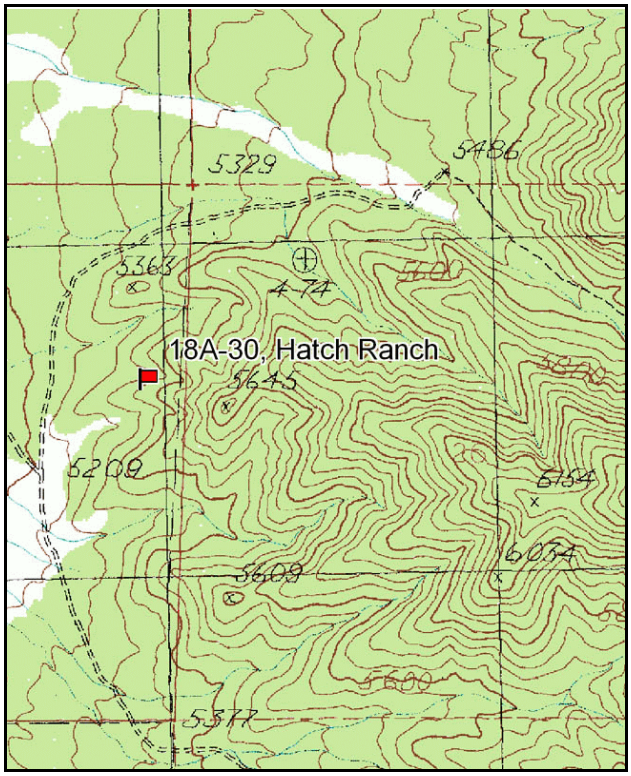
Study site name: Hatch Ranch . Vegetation type: Stansbury Cliffrose .

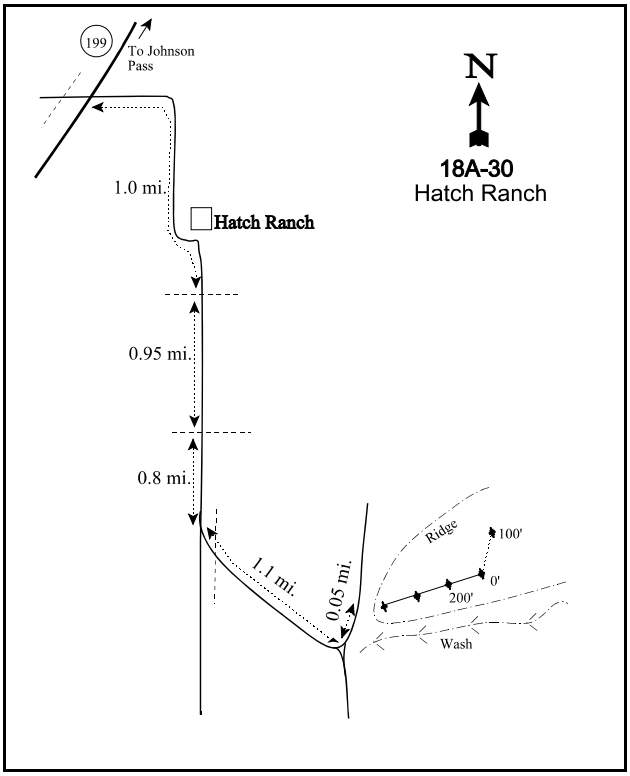
Compass bearing: frequency baseline 42 degrees magnetic (Lines 2-4 @ 250°M).

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar present.

LOCATION DESCRIPTION

Across from the Old Lincoln Road, turn east off of SR-199 onto Hatch Ranch Road. Go east and south 1.0 mile to the Hatch Ranch. From the south gate, continue down the valley 0.95 miles to another gate. Continue 0.8 miles on the main road to a fork that angles southeast through a gate. Take this fork 1.1 miles to a fork at the base of the Onaqui Mountains. Bear left, going just 300 yards to the base of a ridge. From here, walk up the ridge about 400 yards to the 0-foot baseline stake on the ridge top. It is a short green fencepost marked with browse tab #9081.





Map Name: Johnson Pass

Diagrammatic Sketch

Township 6S , Range 7W , Section 26

GPS: NAD 83, UTM 12T 362868 E 4458765 N

DISCUSSION

Hatch Ranch - Trend Study No. 18A-30

Study Information

This study samples critical winter range located at the base of the Onaqui Mountains, approximately 3 miles (4.8 km) south-southeast of Hatch Ranch [elevation: 5,350 feet (1,631 m), slope: 17%, aspect: west]. It is an area of low hills and ridges occupied by a scattered pinyon-juniper woodland and Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*) mixed with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). The entire area is rather depleted of herbaceous understory, especially forbs. Cheatgrass (*Bromus tectorum*) is widespread and found in dense patches. The area is administered by the BLM and is permitted for cattle grazing, which was underway at the time of study establishment in 1983. Little sign of cattle use was noted in 1997, 2002, or 2007. In 1989, evidence of sheep use was noted. Deer use has been moderate-light during sampling periods. Pellet group quadrat frequency was 40% in 1997, and decreased to 8% and 9% in 2002 and 2007, respectively. Deer pellet group transect data estimated 31 days use/acre (76 ddu/ha) in 2002 and 3 days use/acre (8 ddu/ha) in 2007. There was also sign of wild horses in the area in 2002, but not on the study. Stud piles were found down slope from the study, and 10 wild horses were seen on the sagebrush flat nearby.

Soil

The soil is classified within the Lodar-Lundy series (USDA-NRCS 2007). The soils in this series are shallow, well-drained, and moderately permeable. They are formed in residuum and colluvium from limestone, shale, and sandstone. Soil textural analysis shows a clay loam with a neutral reaction (pH 7.1). Approximately 42% of the ground surface is occupied by rock, pavement, or bare soil. Although the rate of soil erosion has been severe in the past, it was considered negligible or quite low in 1997 and 2002. The erosion condition class was determined as slight in 2007 due to some indication of soil movement.

Browse

Stansbury cliffrose and Wyoming big sagebrush combined have provided 51%-75% of the total browse cover since 1997. Sagebrush density has fluctuated between 860 plants/acre (2,125 plants/ha) and 1,260 plants/acre (3,113 plants/ha) since 1983. Average sagebrush cover has been 3%-4% since 1997. Decadence was low at 9% of the population in 1983, but steadily increased to 22% in 2002 and remained high in 2007. Young recruitment was high at 31% of the population in 1983 and 41% in 1989, but decreased to 10% in 1997, and increased to 19% in 2002. No young plants were sampled in 2007. Vigor was good in all years except 1997, when 26% of the mature sagebrush were classified as chlorotic and nearly all of the decadent shrubs were classified as dying. Utilization in 1983 was 43% light and 41% heavy, but has been mostly light since, with 35% moderate-heavy use in 2007. Average annual leader growth was 1.4 inches (3.5 cm) in 2002 and 0.8 inches (2 cm) in 2007.

Cliffrose density increased from just under 600 plants/acre (1,483 plants/ha) in 1983 and 1989 to 1,200 plants/acre (2,965 plants/ha) in 2002, then decreased to 980 plants/acre (2,422 plants/ha) in 2007. The cliffrose population has been mostly mature. Besides a moderately high percentage in 1989, decadence has remained relatively low. Young recruitment was good in 1997, but was low or moderate every other year. These plants have been moderately to heavily hedged during most years. Vigor has been good throughout the study. Annual leader growth averaged 1.7 inches (4.2 cm) in 2002 and 0.6 inches (1.5 cm) in 2007. Utah juniper (*Juniperus osteosperma*) is also present, and had a density of 63 trees/acre (156 trees/ha) in 2002 and 89 trees/acre (220 trees/ha) in 2007.

Herbaceous Understory

Total herbaceous cover was 15% in 1997 and 2007, but was only 8% in 2002, most likely due to drought conditions. Open areas and patches of cheatgrass occupied more ground area than any other class of

vegetation in 1997. Cheatgrass decreased from composing 57% of the total grass cover in 1997 to 6% of the grass cover in 2002 and 17% in 2007. Red brome (*Bromus rubens*) was also sampled in 2007, and made up 16% of the total grass cover. Sandberg bluegrass was the most abundant grass in 2002 and 2007, comprising 87% and 66% of the total grass cover, respectively. Several forb species are present, but only a few occur more than occasionally. Bur buttercup (*Ranunculus testiculatus*), an allelopathic species (Buchanan et al. 1978), was the most abundant forb in 1997 and 2007. Forbs only made up 3% of the total vegetative cover in 1997, 1% in 2002, and 5% in 2007.

1989 TREND ASSESSMENT

The trend for browse is stable. The density of cliffrose decreased slightly from 599 plants/acre (1,480 plants/ha) to 532 plants/acre (1,315 plants/ha). This species increased in decadence from 6% to 38%. Recruitment was low, with young plants comprising only 12% of the population. Cliffrose was the preferred species, and use by both deer and livestock was moderate-heavy. However, vigor remained good. The density of sagebrush increased from 1,066 plants/acre (2,634 plants/ha) to 1,233 plants/acre (3,047 plants/ha). Sagebrush decadence was low, and recruitment was excellent, with young plants making up 41% of the population. Use was light, and vigor was good. The trend for grass is up. The sum of nested frequency for perennial grasses increased 49%. The perennial grasses, Sandberg bluegrass and bluebunch wheatgrass (*Agropyron spicatum*), increased significantly in nested frequency. The trend for forbs is up. The sum of nested frequency for perennial forbs increased substantially. The number of forb species sampled increased from four to 10, and the total nested frequency of forbs greatly increased. However, forbs were still sampled infrequently and provided little forage value.

browse - stable (0) grass - up (+2) forb - up (+2)

1997 TREND ASSESSMENT

The trend for browse is stable. Cliffrose increased in density from 532 plants/acre (1,315 plants/ha) in 1989 to 780 plants/acre (1,927 plants/ha), and made up 38% of the total browse cover. The age class structure improved, with an increase in young plants from 12% of the population to 21%, and a decrease in decadence from 38% of the population to 13%. Vigor was good, and use was mostly light. Sagebrush density decreased from 1,233 plants/acre (3,047 plants/ha) to 960 plants/acre (2,372 plants/ha). The majority (73%) of the population was mature. Young plants in the population decreased from 41% in 1989 to 10% in 1997. Dead plants were noted for the first time in the study, with a density of 380 plants/acre (939 plants/ha). However, the density of sagebrush seedlings increased. Use was mostly light, and plants sampled with poor vigor increased from 5% to 33%. The trend for grass is stable. The sum of nested frequency for perennial grasses decreased 10%. Cheatgrass was the most abundant species, and its average cover was 8%. It comprised 57% of the total grass cover and 52% of the total herbaceous cover. Sandberg bluegrass was the most abundant perennial grass, and remained stable in nested frequency. The trend for forbs is slightly down. There was a significant decrease in the nested frequencies of two perennial forb species. Bur buttercup, which has poor forage value, was the most abundant forb. The Desirable Components Index (DCI) was rated as fair-good due to favorable browse cover, but also an abundance of cheatgrass and a lack of perennial grasses and forbs.

winter range condition (DCI) - fair-good (45) Low potential scale
browse - stable (0) grass - stable (0) forb - slightly down (-1)

2002 TREND ASSESSMENT

The trend for browse is up. Cliffrose density increased from 780 plants/acre (1,927 plants/ha) to 1,200 plants/acre (2,965 plants/ha). The cliffrose population was mainly mature, and the percentage of both young and decadent plants decreased. Use increased to moderate-heavy, and vigor remained good. Sagebrush density also increased, from 960 plants/acre (2,372 plants/ha) to 1,260 plants/acre (3,113 plants/ha). Sagebrush decadence slightly increased from 17% of the population to 22%, and young plants also increased from 10% of the population to 19%. Sagebrush use was mostly light, and vigor improved. The trend for grass

is slightly up. Cheatgrass decreased significantly in nested frequency, and had an average cover of less than 1%. Sandberg bluegrass remained stable in nested frequency. However, due to the decrease in cheatgrass, it increased to making up 87% of the grass cover and 83% of the herbaceous cover. The trend for forbs is down. Only three forb species were sampled in 2002, which decreased from 16 species in 1997. However, the nested frequency of bur buttercup decreased significantly. The DCI was rated as good due to an increase in preferred browse cover and a decrease in cheatgrass.

winter range condition (DCI) - good (56) Low potential scale
browse - up (+2) grass - slightly up (+1) forb - down (-2)

2007 TREND ASSESSMENT

The trend for browse is down. Cliffrose density decreased from 1,200 plants/acre (2,965 plants/ha) to 980 plants/acre (2,422 plants/ha). It comprised 47% of the total browse cover, which is down from 59%. This population remained mature, with low recruitment and decadence. Thirty-one percent of the plants showed moderate use and 22% showed heavy use. Only 4% of the plants displayed poor vigor. The density of sagebrush decreased from 1,260 plants/acre (3,113 plants/ha) to 860 plants/acre (2,125 plants/ha). Sagebrush made up 24% of the total browse cover, which increased from 16% in 2002. This population was also mature. Young recruitment decreased from 19% of the population to 0%, and decadence slightly decreased from 22% of the population to 19%. Plants displaying poor vigor slightly increased from 8% of the population to 12%, and use increased from 8% of the plants showing moderate-heavy use to 35%. The trend for grass is slightly down. Cheatgrass increased significantly in nested frequency, and red brome was sampled for the first time since the study began. Sandberg bluegrass remained the dominant grass, but decreased from comprising 87% of the total grass cover to 66%. The trend for forbs is slightly down. Annual species dominated the forb component of the understory. Bur buttercup increased significantly in nested frequency. The DCI decreased to fair-good due to a decrease in browse cover and recruitment and an increase in annual grasses.

winter range condition (DCI) - fair-good (45) Low potential scale
browse - down (-2) grass - slightly down (-1) forb - slightly down (-1)

HERBACEOUS TRENDS --
Management unit 18A, Study no: 30

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron spicatum	$_{a}$17	$_{b}$39	$_{ab}$24	$_{a}$15	$_{a}$1	.93	.58	.16
G	Bromus rubens (a)	-	-	-	-	109	-	-	2.08
G	Bromus tectorum (a)	-	-	$_{c}$285	$_{a}$73	$_{b}$158	8.10	.46	2.25
G	Oryzopsis hymenoides	-	$_{a}$3	$_{a}$6	-	$_{a}$3	.07	-	.01
G	Poa secunda	$_{a}$192	$_{b}$270	$_{b}$252	$_{b}$269	$_{b}$253	5.09	7.00	8.59
Total for Annual Grasses		0	0	285	73	267	8.10	0.46	4.34
Total for Perennial Grasses		209	312	282	284	257	6.09	7.59	8.76
Total for Grasses		209	312	567	357	524	14.19	8.06	13.10
F	Agoseris glauca	-	-	3	-	-	.03	-	-
F	Alyssum alyssoides (a)	-	-	$_{a}$10	-	$_{a}$10	.02	-	.02
F	Allium sp.	$_{a}$10	$_{a}$6	$_{a}$12	-	-	.06	-	-

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	Antennaria rosea	-	-	$_{a}4$	$_{a}3$	$_{a}3$	.01	.00	.00
F	Astragalus utahensis	-	$_{a}1$	$_{a}3$	-	-	.00	-	-
F	Calochortus nuttallii	$_{a}3$	$_{a}7$	$_{a}1$	-	-	.00	-	-
F	Chaenactis douglasii	-	2	-	-	-	-	-	-
F	Cirsium sp.	-	-	1	-	-	.00	-	-
F	Cryptantha sp.	-	-	-	-	-	-	-	.00
F	Descurainia pinnata (a)	-	-	-	-	21_{a}	-	-	.07
F	Draba sp. (a)	-	-	-	-	56_{a}	-	-	.12
F	Erodium cicutarium (a)	-	-	$_{a}2$	-	$_{b}11$	.01	-	.05
F	Erigeron pumilus	$_{a}1$	$_{b}10$	$_{ab}6$	-	-	.03	-	-
F	Euphorbia sp.	-	-	5	-	-	.01	-	-
F	Haplopappus acaulis	-	6	-	-	-	-	-	-
F	Lappula occidentalis (a)	-	-	-	-	8_{a}	-	-	.01
F	Lactuca serriola	-	$_{b}27$	$_{a}2$	-	-	.03	-	-
F	Lomatium sp.	-	6	-	-	-	-	-	-
F	Microsteris gracilis (a)	-	-	$_{a}2$	-	$_{a}11$	.00	-	.02
F	Oenothera caespitosa	-	2	-	-	-	-	-	-
F	Phlox hoodii	-	-	$_{a}9$	$_{a}9$	$_{a}3$	.21	.36	.15
F	Phlox longifolia	$_{a}2$	$_{a}8$	$_{a}1$	-	-	.00	-	-
F	Ranunculus testiculatus (a)	-	-	$_{b}149$	$_{a}11$	$_{b}189$	.74	.03	1.21
F	Sisymbrium altissimum (a)	-	-	-	-	3	-	-	.03
F	Townsendia incana	-	$_{b}37$	$_{a}4$	-	$_{a}1$	.06	-	.00
Total for Annual Forbs		0	0	163	11	309	0.77	0.03	1.56
Total for Perennial Forbs		16	112	51	12	7	0.47	0.36	0.16
Total for Forbs		16	112	214	23	316	1.25	0.39	1.72

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 18A, Study no: 30

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Artemisia tridentata wyomingensis	34	36	29	3.10	3.30	4.43
B	Chrysothamnus viscidiflorus stenophyllus	13	0	1	.09	-	-
B	Cowania mexicana stansburiana	32	38	38	9.34	12.03	8.75
B	Gutierrezia sarothrae	87	13	43	7.50	.30	.95
B	Juniperus osteosperma	5	5	6	4.09	4.52	4.15
B	Leptodactylon pungens	2	1	1	-	.03	.00
B	Pinus monophylla	0	1	0	-	.00	-
B	Sclerocactus sp.	1	1	1	-	-	-
B	Tetradymia canescens	2	2	0	.15	-	-
B	Tetradymia nuttallii	18	11	4	.38	.09	.15
Total for Browse		194	108	123	24.66	20.29	18.44

CANOPY COVER, LINE INTERCEPT --
Management unit 18A, Study no: 30

Species	Percent Cover		
	'97	'02	'07
Artemisia tridentata wyomingensis	-	4.13	6.16
Chrysothamnus viscidiflorus stenophyllus	-	.03	-
Cowania mexicana stansburiana	-	14.66	17.16
Gutierrezia sarothrae	-	.01	1.20
Juniperus osteosperma	2.59	6.21	7.30
Tetradymia nuttallii	-	.13	-

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 18A, Study no: 30

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata wyomingensis	1.4	0.8
Cowania mexicana stansburiana	1.7	0.6

POINT-QUARTER TREE DATA --
Management unit 18A, Study no: 30

Species	Trees per Acre	
	'02	'07
Juniperus osteosperma	63	89

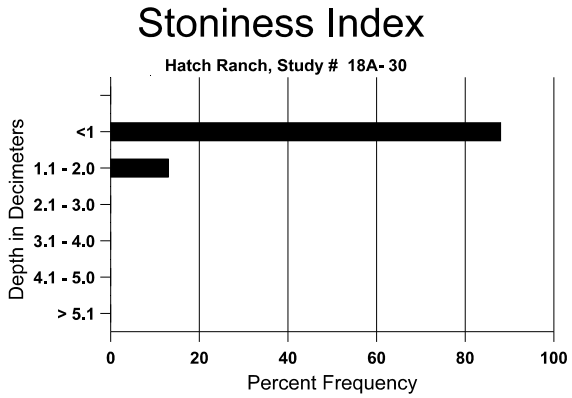
Average diameter (in)	
'02	'07
5.3	5.9

BASIC COVER --
Management unit 18A, Study no: 30

Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	2.00	3.25	34.68	27.06	28.81
Rock	22.75	23.00	16.75	19.56	19.92
Pavement	12.00	21.25	16.10	15.42	19.53
Litter	33.75	27.25	28.58	25.79	29.13
Cryptogams	15.50	16.00	17.79	22.27	13.17
Bare Ground	14.00	9.25	6.42	9.96	5.68

SOIL ANALYSIS DATA --
Herd Unit 18A, Study no: 30, Hatch Ranch

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
6.1	74.3 (8.4)	7.1	35.1	32.7	32.2	2.5	9.5	233.6	.7



PELLET GROUP DATA --
Management unit 18A, Study no: 30

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	45	12	64
Deer	40	8	9
Cattle	1	-	-

Days use per acre (ha)	
'02	'07
-	-
31 (76)	3 (8)
-	-

BROWSE CHARACTERISTICS --
Management unit 18A, Study no: 30

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis												
83	**1066**	66	333	633	100	-	16	41	9	-	16	21/28
89	**1233**	200	500	600	133	-	16	5	11	5	5	20/19
97	**960**	320	100	700	160	380	4	0	17	15	33	19/28
02	**1260**	-	240	740	280	480	5	3	22	8	8	21/30
07	**860**	-	-	700	160	480	21	14	19	5	12	25/37
Chrysothamnus viscidiflorus stenophyllus												
83	**1999**	-	33	1866	100	-	0	0	5	-	3	12/17
89	**1832**	-	66	933	833	-	55	4	45	-	2	7/7
97	**380**	-	20	300	60	60	0	5	16	11	11	9/13
02	**0**	-	-	-	-	60	0	0	0	-	0	9/13
07	**20**	-	20	-	-	-	0	0	0	-	0	-/-
Cowania mexicana stansburiana												
83	**599**	-	66	500	33	-	78	22	6	-	11	50/41
89	**532**	66	66	266	200	-	25	44	38	-	0	37/24
97	**780**	80	160	520	100	100	5	3	13	3	3	51/54
02	**1200**	-	120	1000	80	140	22	48	7	-	0	50/53
07	**980**	20	60	760	160	60	31	22	16	4	4	55/64
Gutierrezia sarothrae												
83	**2866**	133	500	2366	-	-	0	0	0	-	0	11/9
89	**4732**	233	833	3266	633	-	1	0	13	3	8	8/8
97	**12920**	-	1860	10660	400	440	0	0	3	1	1	9/9
02	**520**	-	20	420	80	7500	4	0	15	15	15	5/5
07	**2720**	40	220	2440	60	60	.73	0	2	.73	7	7/8
Juniperus osteosperma												
83	**66**	-	-	66	-	-	0	0	-	-	0	56/42
89	**100**	133	-	100	-	-	0	0	-	-	0	79/45
97	**100**	20	40	60	-	-	0	0	-	-	0	-/-
02	**100**	-	20	80	-	20	0	0	-	-	0	-/-
07	**120**	20	40	80	-	20	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Leptodactylon pungens												
83	**2132**	-	266	1866	-	-	0	0	0	-	2	5/5
89	**2965**	100	166	2733	66	-	0	0	2	-	0	5/6
97	**60**	-	20	40	-	-	0	0	0	-	0	10/26
02	**20**	-	-	-	20	-	0	0	100	100	100	-/-
07	**20**	-	-	20	-	-	0	0	0	-	0	11/11
Pinus monophylla												
83	**0**	-	-	-	-	-	0	0	-	-	0	-/-
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**20**	-	20	-	-	-	0	0	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Sclerocactus sp.												
83	**0**	-	-	-	-	-	0	0	0	-	0	-/-
89	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**20**	-	-	20	-	-	0	0	0	-	0	5/10
02	**40**	-	-	20	20	-	0	0	50	-	0	7/12
07	**20**	-	-	20	-	-	0	0	0	-	0	2/12
Tetradymia canescens												
83	**866**	-	-	400	466	-	0	0	54	-	23	18/19
89	**599**	-	66	100	433	-	28	6	72	6	11	20/19
97	**60**	-	-	60	-	40	0	0	0	-	100	20/25
02	**40**	-	-	-	40	20	0	0	100	50	50	19/30
07	**0**	-	-	-	-	20	0	0	0	-	0	-/-
Tetradymia nuttallii												
83	**0**	-	-	-	-	-	0	0	0	-	0	-/-
89	**66**	-	33	33	-	-	50	0	0	-	0	9/10
97	**580**	-	40	60	480	180	0	0	83	31	31	18/23
02	**280**	-	-	80	200	200	0	0	71	57	57	24/36
07	**80**	-	-	20	60	20	25	0	75	75	75	20/29